AMENDMENTS TO THE CLAIMS

1.-78. (Cancelled)

79. (Previously presented) A method for friction stirring a surface of a high melting temperature material, said method comprising the steps of:

(1) providing a friction stirring tool having a friction stirring surface;

(2) disposing a superabrasive material on the friction stirring surface; and

(3) friction stirring the surface of the high melting temperature material.

80. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of selecting the high melting temperature material from the group of high melting temperature materials including ferrous alloys, non-ferrous materials, superalloys, titanium, cobalt alloys typically used for hard-facing, and air hardened or high speed steels.

81. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of also friction

stirring below the surface of the high melting temperature material.

82. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of forming the friction stirring surface as a pin on the friction stirring tool.

83. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of making the friction stirring surface as a shoulder without a pin on the friction stirring tool.

84. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of making the friction stirring tool from a pin and shoulder combination, wherein only the pin makes contact with the high melting temperature surface when surface friction stirring, and wherein the pin and the shoulder make contact with the high melting temperature surface when friction stirring below the surface.

85. (Previously presented) The method as defined in claim 79 wherein the method further comprises the step of friction stir processing the high melting temperature material to thereby alter the characteristics of the high melting temperature material.

86. (Cancelled) The method as defined in claim 79 wherein the method further comprises the step of friction stir mixing a second material into the high melting temperature material to thereby alter the characteristics of the high melting temperature material.

87. (Previously presented) The method as defined in claim 84 wherein the method further comprises the step of forming the pin as a cylindrical shape, wherein the pin is concentric with and parallel to a lengthwise axis of the shoulder from which it extends outwardly.

88. (Previously presented) The method as defined in claim 87 wherein the method further comprises the step of forming the shoulder as an annular shape having an outer rim that extends outwardly above a central point.

89. A method for friction stir processing a surface of a high melting temperature material, said method comprising the steps of:

(1) providing a friction stir processing tool having a friction stir processing surface;

(2) disposing a superabrasive material on the friction stir processing surface; and

(3) friction stir processing the surface of the high melting temperature material to thereby alter the characteristics of the high melting temperature material.

90. (Previously presented) The method as defined in claim 89 wherein the method further comprises the step of selecting the high melting temperature material from the group of high melting temperature materials including ferrous alloys, non-ferrous materials, superalloys, titanium, cobalt alloys typically used for hard-facing, and air hardened or high speed steels.

91. (Previously presented) The method as defined in claim 89 wherein the method further comprises the step of also friction stir processing below the surface of the high melting temperature material.

92. (Previously presented) The method as defined in claim 89 wherein the method further comprises the step of forming the friction stir processing surface as a pin on the friction stir processing tool.

93. (Previously presented) The method as defined in claim 89 wherein the method further comprises the step of making the friction stir processing surface as a shoulder without a pin on the friction stir processing tool.

94. (Previously presented) The method as defined in claim 89 wherein the method further comprises the step of making the friction stir processing tool from a pin and shoulder combination, wherein only the pin makes contact with the high melting temperature surface when surface friction stir processing, and wherein the pin and the shoulder make contact with the high melting temperature surface when friction stir processing below the surface.

95. (Cancelled) The method as defined in claim 89 wherein the method further comprises the step of friction stir mixing a second material into the high melting temperature material to thereby alter the characteristics of the high melting temperature material.

96. (Previously presented) The method as defined in claim 94 wherein the method further comprises the step of forming the pin as a cylindrical shape, wherein the pin is concentric with and parallel to a lengthwise axis of the shoulder from which it extends outwardly.

97. (Previously presented) The method as defined in claim 96 wherein the method further comprises the step of forming the

shoulder as an annular shape having an outer rim that extends outwardly above a central point.

98. (Cancelled) A method for friction stir mixing a surface of a high melting temperature material, said method comprising the steps of:

(1) providing a friction stir mixing tool having a friction stir mixing surface;

(2) disposing a superabrasive material on the friction stir mixing surface; and

(3) friction stir mixing a second material into the surface of the high melting temperature material to thereby alter the characteristics of the high melting temperature material.

99. (Cancelled) The method as defined in claim 98 wherein the method further comprises the step of selecting the high melting temperature material from the group of high melting temperature materials including ferrous alloys, non-ferrous materials, superalloys, titanium, cobalt alloys typically used for hard-facing, and air hardened or high speed steels.

100. (Cancelled) The method as defined in claim 98 wherein the method further comprises the step of also friction stir mixing below the surface of the high melting temperature material.

101. (Cancelled) The method as defined in claim 98 wherein the method further comprises the step of forming the friction stir mixing surface as a pin on the friction stir mixing tool.

102. (Cancelled) The method as defined in claim 98 wherein the method further comprises the step of making the friction stir mixing surface as a shoulder without a pin on the friction stir mixing tool.

103. (Cancelled) The method as defined in claim 98 wherein the method further comprises the step of making the friction stir mixing tool from a pin and shoulder combination, wherein only the pin makes contact with the high melting temperature surface when surface friction stir mixing, and wherein the pin and the shoulder make contact with the high melting temperature surface when friction stir mixing below the surface.

104. (Cancelled) The method as defined in claim 103 wherein the method further comprises the step of forming the pin as a cylindrical shape, wherein the pin is concentric with and parallel to a lengthwise axis of the shoulder from which it extends outwardly.

105. (Cancelled) The method as defined in claim 103 wherein the method further comprises the step of forming the shoulder as an

annular shape having an outer rim that extends outwardly above a central point.

106. (Previously presented) A friction stirring tool that is capable of functionally friction stirring a surface of a high melting temperature material, said friction stirring tool comprising:

a friction stirring tool having a cylindrical pin; and

a superabrasive material disposed on the pin, and wherein the friction stirring tool is capable of functionally friction stirring a high melting temperature material.

107. (Previously presented) The tool as defined in claim 106 wherein the friction stirring tool further comprises a cylindrical shoulder having a top surface that is concentric with a lengthwise axis of the pin, wherein the pin extends outwardly from a center point of the top surface of the shoulder.

108. (Previously presented) The tool as defined in claim 107 wherein the friction stirring tool further comprises:

the shoulder having an attaching end opposite the top surface; and

a shank coupled to the working end of the shoulder.

109. (Previously presented) The tool as defined in claim 107 wherein the pin and the shoulder are integral components and formed as a single structure.

110. (Previously presented) The tool as defined in claim 108 wherein the pin, the shoulder and the shank are integral components formed as a single structure.

111. (Previously presented) The tool as defined in claim 108 wherein the tool further comprises a locking collar, the locking collar performing the function of mechanically locking the shoulder to the shank to thereby prevent rotational movement of the shoulder relative to the shank.

112. (Previously presented) The tool as defined in claim 111 wherein the tool further comprises a first thermal flow barrier disposed between the shoulder and the shank to thereby regulate movement of heat from the shoulder to the shank.

113. (Previously presented) The tool as defined in claim 112 wherein the tool further comprises a second thermal flow barrier disposed between the locking collar and the portion of the shoulder and the shank around which it is disposed, to thereby regulate movement of heat from the shoulder and the shank to the locking collar.

114. (Previously presented) The tool as defined in claim 111 wherein the tool further comprises providing at least one surface feature disposed along a lengthwise axis of the tool, wherein the surface feature enables the locking collar to more securely restrain the shoulder and the shank in a same relative position.

115. (Previously presented) The tool as defined in claim 114 wherein the tool further comprises selecting the at least one surface feature from the group of surface features comprising a flat, a spline, a keyway and key, a locking pin, a dovetail, and a dentation.

116. (Previously presented) The tool as defined in claim 107 wherein the shoulder further comprises a shoulder radii disposed about a working edge thereof, the shoulder radii functioning as a crack inhibitor in the superabrasive material disposed thereon.

117. (Previously presented) The tool as defined in claim 116 wherein the surface of the shoulder tapers inwards from the shoulder radii to a first pin radii to form an inverted frusto-conical shape.

118. (Previously presented) The tool as defined in claim 116 wherein the surface of the shoulder tapers inwards from the

shoulder radii to a first pin radii, and wherein the shoulder surface is concave.

119. (Previously presented) The tool as defined in claim 116 wherein the surface of the shoulder surface tapers inwards from the shoulder radii to a first pin radii, and wherein the shoulder surface is convex.

120. (Previously presented) The tool as defined in claim 116 wherein the surface of the shoulder forms a plane that is perpendicular to the lengthwise axis thereof.

121. (Previously presented) A method for joining a first high melting temperature material to a second high melting temperature material, said method comprising the steps of:

(1) providing a friction stirring tool having a friction stirring surface;

(2) disposing a superabrasive material on the friction stirring surface; and

(3) friction stirring the first high melting temperature material to the second high melting temperature material, wherein the first high melting temperature material and the second high melting temperature material are functionally friction stirred together.

122. (Previously presented) The method as defined in claim 121 wherein the method further comprises the step of selecting the first and the second high melting temperature materials from the group of high melting temperature materials including ferrous alloys, non-ferrous materials, superalloys, titanium, cobalt alloys typically used for hard-facing, and air hardened or high speed steels.

123. (Previously presented) The method as defined in claim 122 wherein the method further comprises the step of friction stir welding the first high melting temperature material to the second high melting temperature material.

124. (Previously presented) The method as defined in claim 122 wherein the method further comprises the step of friction stir processing the first high melting temperature material and the second high melting temperature material.

125. (Cancelled) The method as defined in claim 122 wherein the method further comprises the step of friction stir mixing a second material with the first high melting temperature material and the second high melting temperature material.